UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

5/5/00

MEMORANDUM

SUBJECT: **Sodium Acifluorfen.** Registrant Response to Reregistration Requirements Regarding Storage Stability, Analytical Methodology, and Rotational Crops (Chemical I.D. No. 114402; MRID Nos. 43451001, 43666601, 43666602, 44137901, and 44153801; DP Barcodes D209767, D231458, and D216267)

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In support of **Sodium Acifluorfen** reregistration requirements, BASF has submitted the following: storage stability data on residues in processed products of peanuts, rice, and soybean; an independent laboratory validation of soybean Method D9205; analytical Method D9404/1 for rice analysis, and supplemental confined rotational crop residue characterization and storage stability data. These data have been reviewed by an HED contractor and have been revised to reflect current Agency policies.

The ILV of Method D9205 is adequate for data collection involving peanuts and its processed products but will require Agency validation before it is considered acceptable for tolerance enforcement purposes. Method D9404/1 is adequate for data collection for rice grain, bran, and straw but a lower LOQ will be required for residues in rice straw if this method is proposed as an enforcement method. The peanut, rice, and soybean storage stability data are adequate for both the RACs and processed

products. The supplemental storage stability and characterization data submitted to upgrade the confined crop rotational studies are adequate. However, the upgraded studies indicate that a 1-year plantback interval (PBI) is necessary for all crops except small grains for which a 6-month PBI is adequate. If shorter PBIs are desired, limited rotational crop field trials will be necessary.

Attachment: 24 pp.

cc: W. Hazel (HED), Joanne Miller (RD), List B File, SF, RF
RDI: F. Fort for W. Phang/RRB1 ExpoTeam rep.: 5/4/00
7509C:CM2:722J:wjh:RRB1:W.J.Hazel:305-7677:5/5/00

SODIUM ACIFLUORFEN
Shaughnessy No. 114402; Case 2605
(DP Barcodes D209767, D231458, D216267)

Registrant's Response to Residue Chemistry Data Requirements

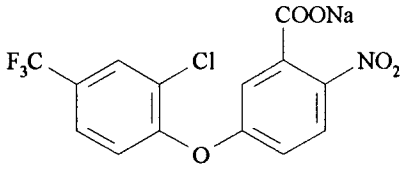
December 5, 1997

Contract No. 68-D4-0010

Submitted to:
U.S. Environmental Protection Agency
Arlington, VA

Submitted by:
Dynamac Corporation
1910 Sedwick Road
Durham, NC 27713

SODIUM ACIFLUORFEN



P.C. Code 114402; Case 2605

(CBRS No. 15738, 17665, and 14767; DP Barcode D216267, D231458, and D209767)

REGISTRANT'S RESPONSE TO RESIDUE CHEMISTRY REQUIREMENTS

BACKGROUND The Sodium Acifluorfen Phase 4 Review (S. Funk, 2/14/91) required storage stability data to support peanut, rice, and soybean processing studies. In response, BASF submitted storage stability data for peanuts (1995; MRID 43666602), rice, and soybeans (1996; MRID 44137901). In addition, BASF has submitted independent method validation data using method D9205 on soybeans (1994; MRID 43451001), a method description and validation data for the analysis of acifluorfen residues in rice commodities (1996, MRID 44153801), and supplemental data (1995; MRID 43666601), previously required by the Agency regarding the qualitative nature of the residue in rotational crops (DP Barcode D192150, L. Cheng, 5/12/94). These data are reviewed here to determine their adequacy in fulfilling residue chemistry data requirements. The Conclusions and Recommendations stated herein pertain only to data requirements for magnitude of the residue in plant processed commodities, analytical methodology, and rotational crops.

The qualitative nature of the residue in plants is not adequately understood. Adequate rice and peanut metabolism data are available. The requirement would be satisfied provided that a recently submitted soybean metabolism study is determined to be adequate.

Tolerances for residues of sodium acifluorfen are currently expressed as the combined residues of the sodium salt of acifluorfen (sodium 5-[2-chloro-4-trifluoromethyl)-phenoxy]-2-nitrobenzoic acid) and its metabolites (the corresponding acid, methyl ester, and amino analogues) in or on plant and in animal commodities [40 CFR § 180.383]. No food or feed additive tolerances have been established for residues of sodium acifluorfen. The Pesticide Analytical Manual (PAM) Vol. II lists Method I, a GLC method with electron capture detection, as available for the enforcement of sodium acifluorfen tolerances.

There are no established Codex MRLs for residues of sodium acifluorfen; therefore, there is no issue with respect to Codex/U.S. tolerance compatibility.

CONCLUSIONS/RECOMMENDATIONS

1a. The independent laboratory validation of method D9205 using soybean grain is adequate. The method must be successfully validated by the Agency before forwarding to FDA for publication in PAM Vol. II as a tolerance enforcement method.

1b. Method D9205 is adequate for data collection on residues of acifluorfen, its amine metabolite, and their methyl esters in/on soybean grain, peanut nutmeats, peanut hulls, and peanut processed commodities (meal, crude oil, and refined oil).

1c. Method D9404/1 is adequate for data collection on residues of acifluorfen, its amine metabolite, and their methyl esters in/on rice grain, straw, and bran. The validated LOQs for rice grain and bran are each 0.10 ppm (0.05 ppm for residues determined as acifluorfen methyl ester and 0.05 ppm for residues determined as acifluorfen amine). The validated LOQ for rice straw is 2.05 ppm (0.05 ppm for acifluorfen and its methyl ester and 2.0 ppm for acifluorfen amine and its methyl ester). The Agency notes that the LOQ for straw is above the established tolerance of 0.10 ppm [40 CFR § 180.383]. In addition, the available residue data indicate that the maximum total residues determined in straw treated at the 1x rate were <0.124 ppm and an increase in the tolerance for rice straw is required (DP Barcode D213553, S. Knizner, 6/14/95). A lower LOQ for rice straw is required if method D9404/1 is the proposed tolerance enforcement method.

1d. Method D9404/1 is adequate for data collection on residues of acifluorfen and its metabolites in rice hulls. Although recoveries of acifluorfen amine methyl ester were low at the fortification levels assayed (52-69% at 0.05 and 2.0 ppm), this is not pertinent because this metabolite was not identified in the rice metabolism study, a tolerance has not been established for residues in rice hulls, and the available data indicate that residues do not concentrate in rice processed commodities (S. Knizner, 6/14/95).

2a. The storage stability data submitted for peanuts are adequate to support the previously submitted peanut and soybean field trial data. The Agency has concluded that an adequate storage stability study for peanuts will suffice for both peanuts and soybeans (S. Funk, 12/5/91). Field trial data for peanuts were found adequate in the Phase 4 pending the submission of data that would reflect the storage stability of acifluorfen and its metabolites in/on peanuts for 18 months at -15 C. Soybean field trial data were found adequate pending the submission of data reflecting the stability of acifluorfen residues in/on soybean grain for up to 6 months (DP Barcode D192866, C. Leung, 4/26/94). Residues of acifluorfen and its metabolites were stable in peanut nutmeats for 18 months.

2b. The storage stability data submitted for peanut processed commodities are adequate to support the available peanut and soybean processing studies. The peanut and soybean processing studies were found adequate pending the submission of adequate data demonstrating the stability of acifluorfen and its metabolites in peanuts or soybeans and

processed commodities stored under frozen conditions for up to 14.3 months for the RAC and up to 13 months for the processed commodities (DP Barcode D204306, S. Knizner, 6/5/95). Although the submitted storage stability data indicate that residues of acifluorfen amine in refined oil are unstable, this is not of concern because this metabolite was not observed in peanut.

2c. The submitted data are adequate to support the available rice residue data. The previously submitted rice field trial and processing data indicate that rice RACs and processed commodities were stored frozen for 42 months prior to analysis (S. Knizner, 6/14/95). For rice grain under frozen conditions, the submitted storage stability study indicates that residues of acifluorfen are stable for 37 months and residues are not expected to decline after 42 months of storage. Residues of acifluorfen methyl ester and acifluorfen amine in rice grain are stable for 43 months. Acifluorfen amine methyl ester residues in rice grain are stable for 23 months and decline by ~40% after 43 months. For rice straw, residues of acifluorfen and its metabolites are stable for 43 months. Data demonstrating the stability of acifluorfen and its metabolites in frozen stored samples of rice processed commodities, while not available, are not required because rice processing involves simple mechanical separation; as a result, stability of residues in stored samples of rice processed products is expected to be similar to that in the RAC.

3a. The submitted supplemental confined rotational crop data are adequate. The further analysis of the MeOH extracts of sorghum forage, fodder, and grain revealed several minor peaks and one large multi-peaked area of radioactivity. The registrant unsuccessfully attempted to attain a greater resolution of this peak by trying several different HPLC systems and conditions. In sorghum fodder, which had the highest levels of M1 in the original study, the further analysis of the MeOH fraction resolved 12 components, each at ≤18.2%TRR (≤0.036 ppm). The majority of the radioactivity eluted over a period of 14 minutes in one multi-peaked area which was collected as three components accounting for 8.6, 18.2, and 14.1% TRR (0.017-0.036 ppm). The registrant has adequately demonstrated that M1 consists of several polar components, none of which accounted for >0.04 ppm of radioactivity. In addition, by comparison of HPLC chromatograms to an isolated reference standard, the registrant demonstrated that none of the components in the multi-peaked areas were the glucoside conjugate of 2-chloro-4-trifluoromethylphenol as was suggested in the original study.

3b. The available confined rotational crop data indicate that ^{14}C-residues >0.01 ppm accumulated in/on all rotational crop commodities of chard, turnip, sorghum, wheat, and radish that were planted at 39, 103, 145, 313, and/or 370 days after [^{14}C]sodium acifluorfen was applied to sandy soil at 0.5 lb ai/A (1x the maximum registered rate). Residue accumulation declined from the shorter rotation intervals to the longer rotation intervals. The parent, acifluorfen, was identified and confirmed in all rotational crop commodities at all sampling intervals and was highest in 39 DAT sorghum fodder (0.024 ppm, 12.3% TRR) and lowest in 145 DAT wheat grain (<0.001 ppm). Residues of M1, which was determined to consist of several polar components, was identified in/on all

rotational crops at levels of 13-65% TRR (0.002-0.110 ppm). Three other unknown polar metabolites were detected in extracts of rotational crop commodities, but were present only at insignificant levels.

3c. The submitted data adequately demonstrate the storage stability of M1 and acifluorfen. Radioactive residues of M1 and acifluorfen were stable in frozen sorghum grain, forage, and fodder samples for 2 years and 8 months.

3d. Residues of acifluorfen were detected at levels of >0.01 ppm in/on commodities of 39 DAT sorghum, 103 DAT chard, and 103 DAT radish. At 1 year, residues of acifluorfen were <0.01 ppm in/on sorghum, chard, and radish commodities; no other plant back intervals (PBIs) were assayed for these crops. Residues of acifluorfen were <0.01 ppm in/on 145 DAT wheat commodities; no other PBIs were assayed for wheat.

3e. The labels must be amended to specify a 12-month plant-back interval for rotated crops other than small grains. A 6-month plant-back interval would be acceptable for small grain crops. If the registrant desires a shorter plant-back interval for any crop, limited field trials will be required (refer to EPA Residue Chemistry Guidelines OPPTS 860 Series, August 1996).

DETAILED CONSIDERATIONS

Residue Analytical Methods

BASF (1994; MRID 43451001) submitted a description and independent method validation data of a GC/ECD and HPLC method for the analysis of acifluorfen, and its methyl ester, amine and amine methyl ester metabolites in soybean grain. The method (D9205) has been previously reviewed and deemed adequate for data collection on combined residues of acifluorfen, its amine metabolite, and their methyl esters in soybean, peanuts, and their processed commodities with a validated LOQ of 0.02 ppm for each analyte in each matrix (S. Knizner, 6/5/95). The independent laboratory validation was conducted by Hazleton Wisconsin, Inc., Madison, WI.

Homogenized soybean grain samples are soaked in 0.1 N NaOH for 1 hour prior to extraction of residues with 1% acetic acid in acetonitrile (ACN). For determination of acifluorfen amine and acifluorfen amine methyl ester, the extract is diluted and analyzed by HPLC with fluorescence detection. For determination of acifluorfen and acifluorfen methyl ester, extracted residues are washed with heptane and ACN. Residues in the ACN fraction are concentrated, partitioned into dichloromethane, washed with acidic water, concentrated and methylated with trimethylsilyl (diazomethane). Residues are cleaned up on a silica gel solid phase extraction (SPE) column. Acifluorfen and acifluorfen methyl ester residues are quantitated together as acifluorfen methyl ester by GC/ECD. The validated limit of quantitation is 0.025 ppm for each analyte. Chromatograms and sample calculations were provided.

A single sample set (11 samples) required 4.5 person hours over 2 calendar days for HPLC analysis and 16 person-hours over 3 calendar days for GC analysis. The analytical laboratory reported that the only problem encountered was instrument instability necessitating reinjection. No communication with the sponsor occurred concerning the method during analysis. Sample chromatograms and calculations were presented.

Control soybean grain samples were fortified at 0.025 ppm or 0.100 ppm of each acifluorfen, its amine metabolite, and their methyl esters (two controls for each fortification level and analyte). Residues were nondetectable (<0.02 ppm for the parent and each metabolite) in two control grain samples. Recoveries were 72.7-111% and are presented in Table 1.

The independent laboratory validation of method D9205 using soybean grain is adequate. The method must be successfully validated by the Agency before forwarding to FDA for publication in PAM Vol. II as a tolerance enforcement method.

Table 1. Independent method validation recovery of acifluorfen, and its methyl ester, amine and amine methyl ester metabolites from fortified control soybean grain samples (MRID 43451001).

Commodity Fortification Level (ppm)	% Recovery [a]			
	Acifluorfen	Acifluorfen methyl ester	Acifluorfen amine	Acifluorfen amine methyl ester
Soybean Grain 0.025	73, 81	78, 88	74, 77	74, 74
Soybean Grain 0.100	87, 92	90, 111	73, 83	77, 86

[a] Two controls were fortified for each metabolite at each fortification level.

In conjunction with the storage stability studies on soybean grain and peanut commodities (MRIDs 44137901 and 4366602), concurrent method recovery data were submitted. Samples were analyzed by BASF, RTP, NC using method D9205.

Concurrent recoveries from control soybean grain samples fortified at 0.20 ppm of each analyte were 61-121% (two samples were outside of acceptable range, 70-120%, Table 3). Residues of acifluorfen, its methyl ester, and acifluorfen amine methyl ester were <0.05 ppm in 10 soybean grain controls; residues of acifluorfen amine were <0.05 ppm in/on five soybean grain controls.

Peanut nutmeats, meal, and refined oil were fortified at 0.20 ppm of acifluorfen and its metabolites. Peanut crude oil was fortified at 0.40 ppm of each analyte and peanut hulls were fortified at 0.20 ppm of acifluorfen and its methyl ester. Peanut hulls were fortified with 0.2 ppm of acifluorfen and its methyl ester and were not fortified with the amine metabolites. Concurrent recoveries were 66-108% (Table 3). Residues in three to six controls of each matrix were nondetectable (<0.02 ppm for each analyte) with the following exceptions: for nutmeats one to two controls bore acifluorfen or its amine metabolite at 0.031-0.039 ppm; for meal two controls

bore acifluorfen amine residues at 0.360 and 0.051 ppm; for crude oil one control bore residues of acifluorfen, its methyl ester, or the amine methyl ester at 0.027-0.028 ppm; for refined oil one control bore the amine methyl ester at 0.144 ppm.

These data indicate that method D9205 is adequate for data collection on residues of acifluorfen, its amine metabolite, and their methyl esters in soybean grain, peanut nutmeats, and peanut processed commodities (meal, crude oil, and refined oil). Method D9205 is adequate for data collection for residues of acifluorfen and its methyl ester in/on peanut hulls.

In addition, BASF submitted a method description and validation data (1996; MRID 44153801) for the analysis of acifluorfen, and its methyl ester, amine and amine methyl ester metabolites in rice grain, straw, hulls, and bran. Analyses were conduced by BASF, RTP, NC according to method D9404/1. This method is a modification of method D9404 which was previously reviewed and determined to be adequate for data collection purposes on rice matrices. However, CBRS recommended that the registrant use chemical anti-oxidants in the extraction of rice hulls to improve recoveries of the amine metabolites (S. Knizner, 6/14/95).

Using method D9404/1 for the determination of acifluorfen and acifluorfen methyl ester residues, rice RAC and processed commodity samples are soaked in 0.1 N NaOH, filtered, and extracted with 1% acetic acid in ACN. Extracted residues are washed with heptane, concentrated, rediluted in dichloromethane, washed with 1N HCl, concentrated, rediluted in acetone, and methylated with 0.04 M trimethylsilyl (diazomethane) or an ethereal solution of dichloromethane. Residues are cleaned up on a silica gel solid phase extraction (SPE) column, concentrated, and diluted in toluene for analysis. Acifluorfen and acifluorfen methyl ester residues are quantitated together as acifluorfen methyl ester by GC/ECD.

For determination of acifluorfen amine and the amine methyl ester, residues in rice samples are hydrolyzed by refluxing in 0.33 N NaOH. Residues are then extracted with concentrated acetic acid and ACN. For rice hulls and straw, potassium metabisulfite is added prior to extraction as an antioxidant. After diluting the extract, residues of acifluorfen amine and the amine methyl ester are quantitated together as acifluorfen amine by HPLC with fluorescence detection. Chromatograms and sample calculations were provided.

For each matrix, one to eight control samples were fortified separately with at each analyte at 0.05, 0.20, or 2.0 ppm. Residues were nondetectable (<0.05 ppm for the parent and each metabolite) in one control of each matrix. Recoveries of each analyte from rice grain and bran fortified at 0.05 or 0.20 ppm were occasionally low, but adequate (62-118%). Recoveries from rice straw and hulls fortified at 0.05 or 0.20 ppm of acifluorfen and acifluorfen methyl ester were also low but adequate (63-106%). For fortified rice straw samples, recoveries of acifluorfen amine were inadequate at 0.05 ppm (46-68%) and adequate at 2.0 ppm (75-95%); recoveries of acifluorfen amine methyl ester were adequate at 0.05 and 2.0 ppm (81-110%). For rice hulls fortified at 0.05 and 2.0 ppm of acifluorfen amine and its methyl ester, recoveries were adequate for the amine (67-97%) and inadequate for the methyl ester (52-69%). Recoveries are presented in Table 2.

In conjunction with the storage stability study on rice (MRID 44137901), concurrent method recovery data were submitted (Table 3). Samples were analyzed by BASF, RTP, NC using method D9404/1. Recoveries from control rice grain samples fortified at 0.20 ppm of each analyte were 74-106%. Recoveries from control rice straw samples fortified at 0.20 ppm of each analyte were 68-129% for acifluorfen, 87-134% for acifluorfen methyl ester, 54-92% for the amine, and 59-82% for the amine methyl ester. Apparent residues of each analyte were nondetectable (<0.05 ppm) in/on 6-11 rice grain and rice straw controls.

These data indicate that method D9404/1 adequately recovers acifluorfen and its regulated metabolites from rice grain and straw. The validated LOQ for rice grain is 0.10 ppm (0.05 ppm for residues determined as acifluorfen methyl ester and 0.05 ppm for residues determined as acifluorfen amine). The validated LOQ for rice straw is 2.05 ppm (0.05 ppm for acifluorfen and its methyl ester and 2.0 ppm for acifluorfen amine and its methyl ester). The Agency notes that the LOQ for straw is above the established tolerance of 0.10 ppm [40 CFR § 180.383]. In addition, the available residue data indicate that the maximum total residues determined in straw treated at the 1x rate were <0.124 ppm (S. Knizner, 6/14/95). A lower LOQ for rice straw is required if method D9404/1 is the proposed tolerance enforcement method.

The validated LOQ for rice bran is 0.10 ppm (0.05 ppm for residues determined as acifluorfen methyl ester and 0.05 ppm for residues determined as acifluorfen amine). Method D9404/1 is inadequate for data collection on residues of acifluorfen and its metabolites in rice hulls. Recoveries of acifluorfen amine methyl ester were inadequate at the fortification levels assayed (52-69% at 0.05 and 2.0 ppm). However, additional testing is not required because no tolerances have been established for residues in rice bran and hulls and the available data indicate that residues do not concentrate in rice processed commodities (S. Knizner, 6/14/95).

Table 2. Method validation recovery of acifluorfen, and its methyl ester, amine and amine methyl ester metabolites in from fortified control samples of rice commodities (MRID 44153801).

Commodity Fortification Level (ppm)	% Recovery [a]			
	Acifluorfen	Acifluorfen methyl ester	Acifluorfen amine	Acifluorfen amine methyl ester
Rice grain				
0.05	72, 94	68, 72	62, 68	80, 84
0.20	93, 103	75, 76	87, 88	79
Rice bran				
0.05	102, 106	98, 102	70, 72	62, 76
0.20	85, 100	107, 118	79, 119	66
Rice straw				
0.05	80, 86	63, 79	46-68 (8)	80-91 (4)
0.20	78, 82	76, 82	---	---
2.0	---[b]	---	75-95 (8)	69-110 (3)
Rice hulls				
0.05	64, 68	104, 106	67-76 (4)	59-69 (4)
0.20	68, 71	96, 104	---	---
2.0	---	---	67-97 (4)	52-65 (4)

[a] If more than two, the number of controls samples fortified are listed parenthetically.

[b] Samples were not analyzed for the designated analytes and levels in the listed matrices.

Storage Stability

The Sodium Acifluorfen Phase 4 Review (S. Funk, 2/14/91) required storage stability data for peanuts, rice, and soybean RACs and processed fractions. The Agency has concluded that an adequate storage stability study for peanuts and processed fractions will suffice for both peanuts and soybeans, including processed fractions (DP Barcode D169747, S. Funk, 12/5/91). An interim storage stability study indicated that residues of acifluorfen and its metabolites are stable in rice grain and straw for up to 22 months (DP Barcode D214314, S. Knizner, 5/30/95). Interim storage stability data for peanuts and peanut processed commodities indicated that acifluorfen amine may not be stable in nutmeat or in peanut meal (DP Barcode D205090, S. Knizner, 8/12/94).

In response to the Phase 4 data requirements, storage stability data were submitted for rice grain and straw, soybeans, peanut nutmeats, peanut hulls, and peanut processed fractions (meal, crude oil, and refined oil) (1996; MRID 44137901 and 1995; MRID 43666602). Control samples of soybean, rice grain, rice straw, peanut nutmeats, and peanut processed commodity samples (except crude oil) were fortified separately with 0.2 ppm of acifluorfen, acifluorfen methyl ester, acifluorfen amine, and acifluorfen amine methyl ester. Peanut crude oil was fortified at 0.4 ppm of each analyte. Peanut hulls were fortified with 0.2 ppm of acifluorfen and its methyl ester and were not fortified with the amine metabolites. Peanut hay and soybean hay samples were not analyzed; however, the labels bear soybean forage and hay grazing/feeding restrictions.

Soybean samples fortified with acifluorfen, its methyl ester, and its amine methyl ester were analyzed at day-0 and after 1.5-7.5 months of frozen storage. Soybeans fortified with acifluorfen amine were analyzed after 0.25-3 months of frozen storage.

Stability of acifluorfen and its metabolites was evaluated in frozen peanuts for intervals up to 18 months and in frozen peanut processed commodities for intervals up to 13 months. Frozen peanut hulls fortified with acifluorfen were analyzed after 3, 6, 9, and 12 months of storage and hulls fortified with acifluorfen methyl ester were analyzed after 3 and 6 months of frozen storage.

Fortified rice grain samples were analyzed at day 0 and at intervals up to 37 months after storage for the parent and up to 43 months for the metabolites. Rice straw samples were analyzed at day 0 and at storage intervals up to 43 months for each analyte. However, results from the day-0 analyses of rice straw were not reported for acifluorfen and its methyl ester because samples were not soaked in a base prior to extraction resulting in unacceptably low recoveries of acifluorfen and its methyl ester from straw. For analyses conducted at 9, 22, 37, and 43 months, samples were soaked in a base prior to extraction of acifluorfen and its methyl ester. For the purposes of this review, the longer storage intervals are compared to the 9-month data.

Rice and soybean samples were stored at <-5 C prior to analysis. Peanut samples were stored at -30 C to <0 C prior to analysis. Analyses were conduced by BASF, RTP, NC according to method D9404/1 for rice grain and straw and method D9205 for soybeans and peanut commodities as described in the Residue Analytical Method Section of this report. Recoveries after storage were corrected for concurrent recoveries and are detailed in Table 3.

For soybeans, recoveries were 83-109% after 7.5 months of frozen storage for acifluorfen, its methyl ester, and the amine methyl ester metabolite of acifluorfen amine. After 3 months of frozen storage, recovery of acifluorfen amine was 95% from soybeans.

Recoveries from peanut nutmeats of each analyte after 18 months frozen storage were 76-121%. Recoveries of each analyte from peanut meal were 78-102% after 13 months of frozen storage. For crude and refined oil, recoveries of acifluorfen, its methyl ester and the amine methyl ester after 13 months of frozen storage were 78-128%. Recoveries of acifluorfen amine from crude oil were 120% after 6 months and 66% after 13 months. Recoveries of acifluorfen amine from refined oil were only 12% after 3 months of storage, the first storage interval assayed. For peanut hulls, recoveries of acifluorfen were 76% after 12 months of frozen storage. Recoveries of acifluorfen methyl ester from frozen peanut hulls were 76 and 65% after 3 and 6 months of frozen storage, respectively.

Recoveries from frozen rice grain samples were 94-108% for acifluorfen after 37 months and its methyl ester and its amine after 43 months. Recoveries of acifluorfen amine methyl ester from frozen rice grain were 102% at 23 months, 30% at 37 months, and 64% at 43 months. Recoveries from frozen rice straw were 69-120% for acifluorfen and its metabolites after 43 months of frozen storage.

The storage stability data submitted for peanuts are adequate to support the previously submitted peanut and soybean field trial data. The Agency has concluded that an adequate storage stability study for peanuts will suffice for both peanuts and soybeans (S. Funk, 12/5/91). Field trial data for peanuts were found to be adequate in the Phase 4 Review pending the submission of data that would reflect the storage stability of acifluorfen and its metabolites in/on peanuts for 18 months at -15 C. Soybean field trial data were found to be adequate pending the submission of data reflecting the stability of acifluorfen residues in/on soybean grain for up to 6 months (L. Cheng, 4/26/94). Residues of acifluorfen and its metabolites were stable in peanut nutmeats for 18 months.

The storage stability data submitted for peanut processed commodities are adequate to support the available peanut and soybean processing studies. The peanut and soybean processing studies were found adequate pending the submission of adequate data demonstrating the stability of acifluorfen and its metabolites in peanuts or soybeans and processed commodities stored under frozen conditions for up to 14.3 months for the RAC and up to 13 months for the processed commodities (S. Knizner, 6/5/95). Although the submitted storage stability data indicate that residues of acifluorfen amine in refined oil are unstable, this is not of concern because this metabolite was not observed in peanut.

The submitted data are adequate to support the available rice residue data. The previously submitted rice field trial and processing data indicate that rice RACs and processed commodities were stored frozen for 42 months prior to analysis (S. Knizner, 6/14/95). For rice grain under frozen conditions, the submitted storage stability study indicates that residues of acifluorfen are stable for 37 months and residues are not expected to decline after 42 months of storage. Residues of acifluorfen methyl ester and acifluorfen amine in rice grain are stable for 43 months. Acifluorfen amine methyl ester residues in rice grain are stable for 23 months and decline by ~40% after 43 months. For rice straw, residues of acifluorfen and its metabolites are stable for 43 months. Data demonstrating the stability of acifluorfen and its metabolites in frozen stored samples of rice processed commodities, while not available, are not required because rice processing involves simple mechanical separation; as a result, stability of residues in stored samples of rice processed products is expected to be similar to that in the RAC.

Table 3. Storage stability data for soybean control samples fortified at 0.2 or 0.4 ppm of each acifluorfen, acifluorfen methyl ester, acifluorfen amine, and acifluorfen amine methyl ester.

Analyte (fortification level) Storage Interval (months)[a]	Stored Recovery (%)	Concurrent Recovery (%)	Corrected Stored Recovery (%) [b]
Soybean grain (MRID 44137901)			
Acifluorfen (0.2 ppm)			
0	--	80	100
1.5	88, 88	83	106
2.5	84, 66	70	107
4	80, 85	78	106
7.5	89, 86	80	109
Acifluorfen methyl ester (0.2 ppm)			
0	--	81	100
1.5	92, 92	76	121
2.5	85, 76	88	91
4	88, 88	91	97
7.5	86, 80	100	83
Acifluorfen amine (0.2 ppm)			
0	--	86, 90, 93, 94	100
0.25	96, 93	94, 95	100
0.5	94, 93	92, 92	102
1	90, 87	88, 121	85
3	83, 82	82, 91	95
Acifluorfen amine methyl ester (0.2 ppm)			
0	--	92	100
1.5	82, 71	74	103
2.5	53, 54	61	88
4	80, 81	92	88
7.5	71, 80	89	85
Rice grain (MRID 44137901)			
Acifluorfen (0.2 ppm)			
0	--	90	100
2	73, 76	75	99
4.5	47, 52	91	54
7	53, 68	83	73
23	50, 68	74	80
37	92	98	94

(continued)

Table 3 (*Continued*)

Analyte (fortification level) Storage Interval (months)[a]	Stored Recovery (%)	Concurrent Recovery (%)	Corrected Stored Recovery (%) [b]
Acifluorfen methyl ester (0.2 ppm)			
0	--	99	100
2	88, 77	100	82
4.5	74, 67	90	78
7	74, 86	88	91
23	76, 76	74	103
37	102	106	96
43	100, 93	91, 106	98
Acifluorfen amine (0.2 ppm)			
0	--	98	100
23	130	83	157
37	53	96	55
43	108	100	108
Acifluorfen amine methyl ester (0.2 ppm)			
0	--	93	100
23	98	96	102
37	32	106	30
43	61	95	64
Rice straw (MRID 44137901)			
Acifluorfen (0.2 ppm)			
9	84	80	105
22	68, 66	68	98
37	91	92	99
43	94, 95	129	73
Acifluorfen methyl ester (0.2 ppm)			
9	87	101	86
22	64, 76	87	80
37	100	107	93
43	92, 92	134	69
Acifluorfen amine (0.2 ppm)			
0	--	57	100
24	82, 80	54, 55	149
37	52	64	81
43	104, 84	92	102

(*continued*)

Table 3 (*Continued*)

Analyte (fortification level) Storage Interval (months)[a]	Stored Recovery (%)	Concurrent Recovery (%)	Corrected Stored Recovery (%) [b]
Acifluorfen amine methyl ester (0.2 ppm)			
0	--	81	100
24	66	59, 75	98
37	47, 45	82	56
43	51, 86	57	120
Peanut nutmeat (MRID 43666602)			
Acifluorfen (0.20 ppm)			
0	82	73	112
3	85	87	98
6	81	76	107
9	100	67	149
12	85	84	101
18	97	80	121
Acifluorfen methyl ester (0.20 ppm)			
0	96	80	120
3	85	108	79
6	86	95	91
9	94	98	96
12	93	87	111
18	84	94	89
Acifluorfen amine (0.20 ppm)			
0	74	66	112
3	47	97	48
6	37	79	47
9	55	86	64
12	47	86	55
18	52	68	76
Acifluorfen amine methyl ester (0.20 ppm)			
0	90	69	130
3	67	88	70
6	81	102	79
9	77	91	85
12	81	73	111
18	73	94	78

(*continued*)

Table 3 (*Continued*)

Analyte (fortification level) Storage Interval (months)[a]	Stored Recovery (%)	Concurrent Recovery (%)	Corrected Stored Recovery (%) [b]
Peanut Meal (MRID 43666602)			
Acifluorfen (0.20 ppm)			
0	95	103	92
3	85	93	91
6	65	71	92
9	97	89	109
13	80	91	88
Acifluorfen methyl ester (0.20 ppm)			
0	94	97	97
3	82	86	95
6	75	71	106
9	81	89	91
13	86	84	102
Acifluorfen amine (0.20 ppm)			
0	94	87	108
3	88	97	91
6	57	101	56
9	61	84	73
13	79	93	85
Acifluorfen amine methyl ester (0.20 ppm)			
0	83	79	105
3	79	88	90
6	83	95	87
9	76	100	76
13	73	94	78
Peanut Crude Oil (MRID 43666602)			
Acifluorfen (0.40 ppm)			
0	71	69	103
3	72	77	94
6	66	87	76
9	90	80	113
13	68	87	78

(*continued*)

Table 3 (*Continued*)

Analyte (fortification level) Storage Interval (months)[a]	Stored Recovery (%)	Concurrent Recovery (%)	Corrected Stored Recovery (%) [b]
Acifluorfen methyl ester (0.40 ppm)			
0	90	98	92
3	82	87	94
6	85	90	94
9	NA=not analyzed	NA	NA
13	82	89	92
Acifluorfen amine (0.40 ppm)			
0	76	75	101
3	96	94	102
6	91	76	120
9	NA	NA	NA
13	61	93	66
Acifluorfen amine methyl ester (0.40 ppm)			
0	94	90	104
3	86	88	98
6	98	103	95
9	NA	NA	NA
13	98	90	109
Peanut Refined Oil (MRID 43666602)			
Acifluorfen (0.20 ppm)			
0	83	76	109
3	60	67	90
6	90	98	92
9	75	74	101
13	84	87	97
Acifluorfen methyl ester (0.20 ppm)			
0	95	100	95
3	75	79	95
6	95	95	100
9	103	101	102
13	102	80	128
Acifluorfen amine (0.20 ppm)			
0	85	91	93
3	12	98	12
6	6	90	7
9	5	98	5

(*continued*)

Table 3 (*Continued*)

Analyte (fortification level) Storage Interval (months)[a]	Stored Recovery (%)	Concurrent Recovery (%)	Corrected Stored Recovery (%) [b]
13	25	103	22
Acifluorfen amine methyl ester (0.20 ppm)			
0	94	77	122
3	83	77	108
6	83	85	98
9	93	92	101
13	96	98	98
Peanut Hulls (MRID 43666602)			
Acifluorfen (0.20 ppm)			
0	87	76	110
3	64	76	84
6	58	76	76
9	60	70	86
13	68	89	76
Acifluorfen methyl ester (0.20 ppm)			
0	89	89	100
3	64	84	76
6	65	100	65

[a] Storage intervals are in months unless otherwise specified.
[b] Corrected for concurrent recoveries by the registrant.

Confined Rotational Crops

A previously reviewed confined rotational crop study for sodium acifluorfen was found inadequate because the major residue (M1) was not identified. In addition, quantitative data depicting the stability of M1 and acifluorfen in frozen storage were required (L. Cheng, 5/12/94). The maximum storage interval in the original study was 9 months. In response, BASF has submitted supplemental data (1995; MRID 43666601) regarding the qualitative nature of the residue in rotational crops.

Samples of sorghum grain, fodder, and forage from the original study were re-extracted and analyzed; all in-life information can be found in the original review (L. Cheng, 5/12/94). Only the sorghum samples collected from the 39 days after treatment (DAT) interval were analyzed. Samples in the current submission were stored for 2 years and ~8 months at -30 to 0 C prior to analysis.

The TRR in the 39-DAT sorghum fodder, grain, and forage samples were determined in the original study and were 0.198, 0.070, and 0.062 ppm, respectively.

Extraction of ^{14}C-residues in/on plant commodities

All samples were homogenized prior to extraction. Sorghum grain, fodder, and forage were soaked overnight in water prior to Soxhlet-extraction with methanol (MeOH) for 24 hours. The MeOH extract was concentrated and analyzed by HPLC. Non-extractable solids were not analyzed further. Table 1 shows the distribution of ^{14}C-residues in soluble and insoluble fractions.

Metabolite characterization and identification

For characterization/identification of M1, concentrated MeOH extracts were analyzed by HPLC. Reverse-phase HPLC was performed using a Keystone Prism column. The two gradient mobile phases employed were (i) H_2O with 4 mM NH_3COOH and 0.1% HCOOH and (ii) MeOH with 4 mM NH_3COOH and 0.1% HCOOH. The distribution of the radioactivity in the MeOH extracts of sorghum grain, fodder, and forage is presented in Table 4.

Other HPLC analyses were conducted in unsuccessful attempts to further resolve M1 using the following systems: YMC AQ-303, I-20; PRP-1, I-13; Shandon Hypercarb, SN 5371; Spherisorb ODS-1, I-45; Spherisorb ODS-30, IA-17.

In the original study, the parent, acifluorfen, was identified and confirmed in/on all rotational crop commodities at all sampling intervals and was highest in 39 DAT sorghum fodder (0.024 ppm, 12.3% TRR). The major radioactive component observed in all analyzed extracts from rotational crop commodities was designated as M1. M1 levels were highest in 39 DAT sorghum fodder (0.110 ppm, 55.7% TRR), but was only a minor component in all other rotational crop commodities (0.002-0.05 ppm, 13-54.9% TRR) regardless of the sampling interval.

In the current submission, HPLC analysis of sorghum grain resolved 12 components, nine of which were each at ≤ 5.7%TRR and 0.004 ppm. The three remaining regions of radioactivity were collected from one multi-component peak that eluted over a period of 6 minutes; each of these components were at 17.1-20.0% TRR and 0.012-0.014 ppm. None of the components was identified.

HPLC analysis of sorghum fodder resolved 12 components, nine of which were each at ≤ 9.1%TRR and 0.018 ppm. The remaining three components accounted for 8.6, 18.2, and 14.1% TRR (0.017-0.036 ppm) and were collected from one multi-peaked area of radioactivity which eluted over a period of 14 minutes. None of the components was identified.

Acifluorfen was identified in sorghum forage at 3.2% TRR (0.002 ppm). Eight unidentified components were resolved by HPLC, each of which accounted for 1.6-6.4% TRR (0.001-0.004 ppm). One multi-peaked region of radioactivity that eluted over a period of 10 minutes was collected as one fraction and accounted for 51.6% TRR and 0.032 ppm. This large region of

radioactivity was similar to the multi-peaked areas found in sorghum fodder and grain. However, because the peaks were even less resolved than in the other two extracts, it was collected as one fraction to give a conservative estimate of the magnitude of radioactivity represented. The registrant designated the region as M1. No further analyses were performed.

Analyses were conducted to determine if any of the individual components in the multi-peaked area were a glucoside conjugate of 2-chloro-4-trifluoromethylphenol as was suggested in the original study. The glucoside of this metabolite was isolated from peanut leaf disks which were treated with ^{14}C-acifluorfen. The identity of this metabolite in the peanut leaf sample was confirmed by MS. In addition, sorghum fodder was fortified with the glucoside conjugate of 2-chloro-4-trifluoromethylphenol and analyzed by HPLC in order to account for any matrix effects. A comparison of the HPLC chromatograms obtained from the sorghum and peanut sample indicated that none of the components of the multi-peaked areas were the glucoside conjugate of 2-chloro-4-trifluoromethylphenol. In addition, the comparison demonstrated that the ^{14}C-residues in the multi-peaked areas were more polar than the glucoside conjugate.

The submitted supplemental confined rotational crop data are adequate. Further analysis of the MeOH extracts of sorghum forage, fodder, and grain revealed several minor peaks and one large multi-peaked area of radioactivity. The registrant unsuccessfully attempted to attain a greater resolution of this peak by trying several different HPLC systems and conditions. In sorghum fodder, which had the highest levels of M1 in the original study, the further analysis of the MeOH fraction resolved 12 components, each at ≤18.2%TRR (≤0.036 ppm). The majority of the radioactivity eluted over a period of 14 minutes in one multi-peaked area which was collected as three components accounting for 8.6, 18.2, and 14.1% TRR (0.017-0.036 ppm). The registrant has adequately demonstrated that M1 consists of several polar components, none of which accounted for >0.04 ppm of radioactivity.

The available confined rotational crop data indicate that ^{14}C-residues >0.01 ppm accumulated in/on all rotational crop commodities of chard, turnip, sorghum, wheat, and radish that were planted at 39, 103, 145, 313, and/or 370 days after [^{14}C]sodium acifluorfen was applied to sandy soil at 0.5 lb ai/A (1x the maximum registered rate). Residue accumulation declined from the shorter rotation intervals to the longer rotation intervals. The parent, acifluorfen, was identified and confirmed in all rotational crop commodities at all sampling intervals and was highest in 39 DAT sorghum fodder (0.024 ppm, 12.3% TRR) and lowest in 145 DAT wheat grain (<0.001 ppm). Residues of M1, which was determined to consist of several polar components, was identified in/on all rotational crops at levels of 13-65% TRR (0.002-0.110 ppm). Three other unknown polar metabolites were detected in extracts of rotational crop commodities, but were present only at insignificant levels.

Residues of acifluorfen were detected at levels of >0.01 ppm in/on commodities of 39 DAT sorghum, 103 DAT chard, and 103 DAT radish (see Table 5). At 1 year, residues of acifluorfen were <0.01 ppm in/on sorghum, chard, and radish commodities; no other plant back intervals (PBIs) were assayed for these crops. Residues of acifluorfen were <0.01 ppm in/on 145 DAT wheat commodities; no other PBIs were assayed for wheat. The labels must be amended to

specify a 12-month plant-back interval for rotated crops except small grains. A 6-month plant-back interval would be acceptable for small grain crops. If the registrant desires a shorter plant-back interval for any crop, limited field trials will be required (refer to EPA Residue Chemistry Guidelines OPPTS 860 Series, August 1996).

Table 4. Distribution of total radioactive residues (TRR) in MeOH extract of rotational sorghum grown in aged sandy soil treated with [^{14}C]sodium acifluorfen at 0.5 lb ai/A.

Fraction	%TRR	ppm	Characterization/Identification
Substrate = 39 DAT Sorghum Grain (0.070 ppm)			
MeOH	82.9	0.058	HPLC using Keystone Prism column resolved: Region 1 1.4% TRR, 0.001 ppm Region 2 1.4% TRR, 0.001 ppm Region 3 2.9% TRR, 0.002 ppm Region 4 1.4% TRR, 0.001 ppm Region 5 20.0% TRR, 0.014 ppm Region 6 17.1% TRR, 0.012 ppm Region 7 18.9% TRR, 0.013 ppm Region 8 5.7% TRR, 0.004 ppm Region 9 2.9% TRR, 0.002 ppm Region 10 2.9% TRR, 0.002 ppm Region 11 5.7% TRR, 0.004 ppm Region 12 2.9% TRR, 0.002 ppm
Non-extractable	17.1	0.012	Not analyzed further.
Substrate = 39 DAT Sorghum Fodder (0.198 ppm)			
MeOH	86.9	0.172	HPLC using Keystone Prism column resolved: Region 1 2.0% TRR, 0.004 ppm Region 2 9.1% TRR, 0.018 ppm Region 3 7.6% TRR, 0.015 ppm Region 4 7.6% TRR, 0.015 ppm Region 5 7.1% TRR, 0.014 ppm Region 6 18.2% TRR, 0.036 ppm Region 7 8.6% TRR, 0.017 ppm Region 8 14.1% TRR, 0.028 ppm Region 9 2.5% TRR, 0.005 ppm Region 10 5.1% TRR, 0.010 ppm Region 11 2.0% TRR, 0.004 ppm Region 12 3.5% TRR, 0.007 ppm
Non-extractable	13.1	0.026	Not analyzed further.
Substrate = 39 DAT Sorghum Forage (0.062 ppm)			

MeOH	75.8	0.047	HPLC using Keystone Prism column resolved: Region 2 1.6% TRR, 0.001 ppm M1 51.6% TRR, 0.032 ppm Region 4 1.6% TRR, 0.001 ppm Region 5 1.6% TRR, 0.001 ppm Region 6 1.6% TRR, 0.001 ppm Region 7 1.6% TRR, 0.001 ppm Region 9 1.6% TRR, 0.001 ppm acifluorfen 3.2% TRR, 0.002 ppm Region 11 6.4% TRR, 0.004 ppm Region 12 4.8% TRR, 0.003 ppm
Non-extractable	24.2	0.015	Not analyzed further.

Table 5. Summary of acifluorfen in MeOH extract of rotational chard, sorghum, radish, and wheat grown in aged sandy soil treated with [^{14}C]sodium acifluorfen at 0.5 lb ai/A. [a]

Substrate	Residues of Parent (Acifluorfen, ppm)				
	39 DAT	103 DAT	145 DAT	313 DAT	370 DAT
Chard		0.02		0.003	
Sorghum forage	0.011				0.002
Sorghum fodder	0.024				0.001
Sorghum grain	0.014				0.001
Radish tops		0.023		0.004	
Radish roots		0.008		NA [b]	
Wheat forage			0.003		
Wheat straw			0.002		
Wheat grain			<0.001		

a These data were obtained from the original study , MRID 42785601, L. Cheng, 5/12/94.
b NA=not analyzed; TRR <0.01 ppm.

Storage Stability

To determine the storage stability of the TRR, a sample of sorghum grain from the original study was re-combusted. The TRR after 2 years and 8 months of frozen storage (the storage interval of the samples in the current submission) was 98.8% of the original analysis (0.069 ppm). To

determine the storage stability of M1 and acifluorfen in sorghum grain, forage, and fodder, samples from the original study were MeOH extracted after 2 years and 8 months of frozen storage using the same procedure as was used in the original study and is described below. Extracts were analyzed by TLC and HPLC using the same conditions and solvent systems that were employed in the original study. The TLC was performed on silica gel plates developed with chloroform:MeOH:H_2O (60:30:4, v:v:v). The reverse-phase HPLC was performed using a Partisil Magnum column with gradient mobile phases of acetic acid:H_2O (1:4, v:v) and ACN:H_2O (1:4, v:v).

For sorghum grain, MeOH extractable residues comprised 87.2% and 88.0% of the TRR in the original and stored samples, respectively. As determined by TLC, M1 in grain comprised 70.6% and 69.5% of the extracted TRR in the original and stored samples, respectively. As determined by HPLC, M1 in grain comprised 73.1% and 78.7% of the extracted TRR in the original and stored samples, respectively. Acifluorfen comprised 26.4% and 21.5% of the extracted TRR by TLC in the original and stored samples, respectively.

HPLC chromatographic profiles of the sorghum forage and fodder samples were similar before and after storage.

These data indicated that acifluorfen and M1 are stable in sorghum grain, forage, and fodder samples for 2 years and 8 months of frozen storage.

MASTER RECORD IDENTIFICATION NUMBERS

The citation for the MRID documents used in this review are presented below.

43666601 Geiger, D.; Goetz, A. (1995) Further Characterization Analysis of Metabolite 1 from the (Carbon-14)-Sodium Acifluorfen Confined Rotational Crop: Lab Project Number: 94127: M9427: 91058. Unpublished study prepared by BASF Corp. 55 p.

43666602 Panek, M. (1995) Freezer Storage Stability of BAS 9048 H and its Metabolites in Peanut Nutmeat, Hulls, and Peanut Processed Fractions (in Hulls Fractions (in Hulls, Stability Data for BAS 9048 H and BH 9048 ME only): Lab Project Number: 95/5059: 93123: A9422. Unpublished study prepared by BASF Corp. 123 p.

44137901 Burkey, J. (1996) Freezer Storage Stability of Acifluorfen and Its Metabolites in Rice Grain and Straw and Soybean Grain: (Final Report): Lab Project Number: 91163: 96/5180: RCN 92168. Unpublished study prepared by BASF Corp. 87 p.

44153801 Stewart, J. (1996) Method for Determination of Residues of Acifluorfen and Metabolites in Rice Raw Agricultural Commodities (Grain and Straw) Commodities (Grain and Straw) and Processed Commodities (Hulls, Bran and Polished Rice) by Gas and Liquid

Chromatography: Validation of Method D9404/1: Lab Project Number: 96/5176:94159. Unpublished study prepared by BASF Corp. 159 p.

43451001 Siirila, A.; Zeller, A. (1994) Independent Method Validation of BASF Analytical Method No. D9205: "Method for Determination of Residues of Acifluorfen and Metabolites in Soybean Grain by Gas and Liquid Chromatography" at Hazleton Labs: Final Report: Lab Project Number: A 9456: HWI 6101-128: 94/5161. Unpublished study prepared by Hazleton Wisconsin, Inc. 137 p.

AGENCY MEMORANDA CITED IN THIS DOCUMENT

CBRS No. 8741
DP Barcode: D169747
Subject: Reregistration of Sodium Acifluorfen. BASF Corporation. 90 Day Response to Phase 4 DCI.
From: S. Funk, CBRS
To: T. Luminello, SRRD
Date: 12/5/91
MRID(s): None

CBRS No. 12181
DP Barcode: D192899
Subject: Sodium Acifluorfen. Nature of Residue in Poultry, Residue Method in Plants, and Magnitude of Residue in Soybeans.
From: L. Cheng, CBRS
To: K. Davis/T. Luminello, SRRD
Date: 4/26/94
MRID(s): 42828201, 42825701, & 42825702.

CBRS No. 11988
DP Barcode: D192150
Subject: Sodium Acifluorfen. Case No. 2605. Confined Rotational Crop Study in Chard, Radish, Turnips. Sorghum, and Wheat.
From: L. Cheng, CBRS
To: T. Luminello, SRRD
Date: 5/12/94
MRID(s): 42785601

CBRS No. 13998
DP Barcode: D205090
Subject: Sodium Acifluorfen. Peanut Storage Stability Study Progress Report.
From: S. Knizner, CBRS

To: T. Luminello, SRRD
Date: 8/12/94
MRID(s): 43290101

CBRS No. 14409
DP Barcode: D207702
Subject: Response to the Sodium Acifluorfen DCI: Confined Rotational Crop Study and Time Extension Request.
From: R.B. Perfetti, CBRS
To: E. Saito, SRRD
Date: 9/29/94
MRID(s): 43372501

CBRS No. 15424
DP Barcode: D214314
Subject: Sodium Acifluorfen. Rice Storage Stability Study Progress Report.
From: S. Knizner, CBRS
To: T. Luminello, SRRD
Date: 5/30/95
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CBRS No. 13879
DP Barcode: D204306
Subject: Sodium Acifluorfen. Peanut and Soybean Processing Study.
From: S. Knizner, CBRS
To: T. Luminello, SRRD
Date: 6/5/95
MRID(s): 43254901 and 43254902

CBRS No. 15335
DP Barcode: D213553
Subject: Sodium Acifluorfen. Magnitude of the Residue in Rice and Rice Processed Commodities.
From: S. Knizner, CBRS
To: T. Luminello, SRRD
Date: 6/14/95
MRID(s): 43584501 and 43584502